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10/667,339	09/23/2003	Shogo Hirose	117255	9283

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EXAMINER	
LEUNG, JENNIFER A	

ART UNIT	PAPER NUMBER
1797	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/667,339	HIROSE ET AL.	
	Examiner	Art Unit	
	JENNIFER A. LEUNG	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 November 2008 and 16 December 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2 and 4-21* is/are pending in the application.

4a) Of the above claim(s) *13-15* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4-12 and 16-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submissions filed on November 19, 2008 and December 16, 2008 have been entered.

Status of the Claims

2. Claim 3 is cancelled. Claims 13-15 are withdrawn from consideration. Claims 1, 2, 4-12 and 16-21 are under consideration.

Response to the Declaration

3. The declaration under 37 CFR 1.132 filed on December 16, 2008 is insufficient to overcome the rejections of claims 1, 2, 4-12 and 16-21 under 35 U.S.C. 103(a), as set forth in the last Office action, because the evidence of critical or unexpected results is not commensurate in scope with the claimed invention.

Whether the unexpected results are the result of unexpectedly improved results or a property not taught by the prior art, the objective evidence of nonobviousness must be commensurate in scope with the claims which the evidence is offered to support. In other words, the showing of unexpected results must be reviewed to see if the results occur over the entire claimed range. See MPEP 716.02(d).

Claim 1 currently recites that each slit has,

i) a width in the range from 0.2 mm to 1 mm, and

ii) a length in the range of 1 mm to a) 30 mm or b) half the length of the honeycomb structure (whichever is shorter).

Although the evidence (see, e.g., DPF units 3-5, 8 and 9 in Table 1) may support the claimed limitation of a slit width within the range of 0.2 mm to 1 mm, the evidence does not support the claimed limitation of a slit length within the range of 1 mm to a) 30 mm or b) half the length of the honeycomb structure (whichever is shorter). In particular, the evidence does not address the lower end of the claimed range, i.e., a slit length of 1 mm, or the criteria b).

In view of the foregoing, when all of the evidence is considered, the totality of the rebuttal evidence of nonobviousness fails to outweigh the evidence of obviousness.

Response to Arguments

4. Applicant's arguments filed on November 19, 2008 have been fully considered but they are not persuasive.

Applicant (page 2, last paragraph) reiterates their previous argument that the dimensions of the slits would not have been considered result effective variables by one having ordinary skill in the art. Applicant bases this assertion on three reasons-- first, the variations of both width and length of the slit constitute two separate variables, which is contrary to the doctrine of a result effective variable; second, Tomita does not disclose that the variations to the length of the slit achieve a recognized results; and third, the specification of Hijikata discloses the intended general dimensions of the slits, and thus negates and presumption that one of ordinary skill in the art would have tried to optimize the dimensions of the slits in a different manner.

The Examiner respectfully disagrees.

Regarding the first and second reasons, the Examiner maintains that the width and the length of the slits would have been recognized as result effective variables by one having ordinary skill in the art.

Tomita, for instance, teaches that the pressure loss and collecting efficiency of a filter will depend on the opening area of the blowing holes, i.e., slits, in a honeycomb body. If the opening area is too large, almost all the exhaust gas will pass through the slits, without collecting any particulates on the filter walls. If the opening area is too small, the honeycomb structure will be quickly clogged by the particulates. (see column 4, lines 19-28, and column 5, lines 16-24). FIG. 7 of Tomita further illustrates the relationship between the pressure loss E, collecting efficiency F and opening area (X-axis) of a honeycomb body. From the plotted data, one can conclude that as the opening area of a slit increases, the pressure loss E and the filtration efficiency F of a filter decrease.

In square or rectangular slits, the opening area equals the width times the length of the slit. Clearly, a slit having a large width and a long length would define a large opening area, and hence, decrease the pressure loss and filtration efficiency of the filter. Conversely, a slit having a small width and a short length would define a small opening area, and hence, increase the pressure loss and filtration efficiency of the filter. A slit having a small width and a long length, or a slit having a large width and a short length, would define an opening area between the two extremes, as well as a pressure loss and filtration efficiency between the two extremes.

Hidaka et al. further teaches that the mechanical strength of a honeycomb body is a function of the slit length (see section [0053]). Therefore, Hidaka et al. suggests maintaining the slit length below a maximum to maintain the mechanical integrity of the structure. One of

ordinary skill in the art would have thus expected that as the slit length increases, the mechanical strength of the honeycomb body decreases.

Given the known and expected relationship between the slit opening area, pressure loss and collecting efficiency, and the known and expected relationship between slit length and mechanical strength, it would have been obvious for one of ordinary skill in the art at the time the invention was made to optimize the width and length of the slits in the modified honeycomb body of Kuwamoto et al., in order to produce a suitable opening area (as determined by the width times the length) for achieving a suitable pressure loss and filtration efficiency, while maintaining a suitable level of mechanical strength of the honeycomb body (as determined by the length of the slits). The optimal balance between the pressure loss, filtration efficiency and mechanical strength will depend in the intended use of the honeycomb body.

Regarding the third reason, although Hijikata may present embodiments (e.g., FIG. 4) in which the width of the slit appears to equal to the full inner width of the cell, the disclosure of Hijikata does not specifically exclude other slit widths. For example, FIG. 20 suggests that slit widths that are narrower than the full inner width of the cell may be used (see dotted lines identifying the openings **36**). The prior art's mere disclosure of more than one alternative does not constitute a teaching away from any of these alternatives because such disclosure does not criticize, discredit, or otherwise discourage the solution claimed. See MPEP 2123 II. Also, the Examiner asserts that the illustrations of the slit dimensions are merely schematic, and not evidence of actual practical dimensions.

Lastly, regarding the Hirose declaration, the Examiner asserts that the results presented in Table 1 would have been expected by one of ordinary skill in the art, in view of the teachings of

Tomita (i.e., Tomita taught that as the opening area increases, the pressure loss and the filtration efficiency decrease). In comparing units 2-5 and 8-10, as the opening area of the slit increases (i.e., from a width of 0.1 mm to 1.2 mm, with the length held constant at 30 mm), the pressure drop and the filtration efficiency of the DPF decrease. In comparing units 5-7, as the opening area of the slit increases (i.e., from a length of 30 mm to 84 mm, with the width held constant at 0.5 mm), the pressure drop and the filtration efficiency of the DPF decrease. In comparing units 10 and 11, as the opening area of the slit increases (i.e., from a length of 30 to 35, with the width held constant at 1.2 mm), the pressure drop and the filtration efficiency of the DPF decrease.

In addition, the evidence does not seem to support a criticality of the claimed range, given that Unit 2 (which includes a slit width of 0.1 mm that is outside of the claimed range) produces results that are comparable to the units within the claimed range. Applicant's original specification further supports this assertion of non-criticality, since it noted that the claimed slit widths and lengths are merely "preferred" (see, e.g., paragraphs [0024], [0025], [0026]).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1, 2, 4, 10-12 and 16-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuwamoto et al. (US 5,853,459) in view of Hijikata et al. (US 5,566,545) and Tomita et al. (US 4,464,185).

Regarding claims 1, 2, 4, 10, 16 and 21, Kuwamoto et al. discloses a system for purifying an exhaust gas containing carbon particulates, said system comprising: a honeycomb structure (i.e., exhaust gas filter **15a**, **15b**, FIG. 3; shown in detail in FIGs. 1, 2) comprising,

> a plurality of through channels (i.e., through holes **3**) separated by porous partition walls (i.e., through hole diaphragms **2**) and extending in an axial direction of the honeycomb structure; wherein all of said through channels **3** have plugging portions (i.e., sealing portions **4**), respectively that plug alternately at either one end of the honeycomb structure or its opposite end in a checkered flag pattern (see FIG. 2); and

heating means (**17a**, **17b**; FIG. 3) for burning the particulate materials filtered by the honeycomb structure **15a**,**15b** to regenerate a filterability.

Kuwamoto et al. is silent as to the honeycomb structure **15a**,**15b** comprising at least one slit per through channel formed only in the vicinity of the plugging portion of the partition walls surrounding the respective through channels.

Hijikata et al., however, teaches a honeycomb structure (i.e., an exhaust gas filter **30**) defining a plurality of through channels **33** comprising downstream plugging portions (i.e., sealed portions **34**), relative to the direction of the exhaust gas flow. Hijikata et al. further teaches the provision of at least one slit (i.e., an auxiliary pulse gas stream channel **36**) only in

the vicinity of the plugging portions **34**. (see FIGs. 4, 7). The at least one slit **36** creates a passageway for directing a pulse gas stream into the through channels **33** in the immediate vicinity of the plugging portions **34**, to thereby regenerate the filterability of the honeycomb structure by removing the particulates **53** that tend to undesirably accumulate behind the plugging portions **34** during use (see column 8, lines 16-61; FIGs. 8A-C, 9).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the honeycomb structure **15a**,**15b** in the apparatus of Kuwamoto et al. to comprise at least one slit per through channel formed only in the vicinity of the plugging portions of the partition walls surrounding the respective through channels, because the at least one slit would create a passageway for directing the gas stream (i.e., from blowing means **22**) into the through channels in the immediate vicinity of the downstream plugging portions **4** (relative to the exhaust gas flow), to thereby regenerate the filterability of the honeycomb structure **15a**,**15b** by removing the particulates that tend to undesirably accumulate behind the plugging portions of the honeycomb structure during use, as suggested by Hijikata et al.

Although Hijikata et al. does not specifically teach the claimed dimensions for each slit, the claimed dimensions do not confer patentability to the claim, since the precise dimensions for each slit would have been considered a result effective variable by one having ordinary skill in the art, as evidenced by Tomita et al. For instance, Tomita et al. teaches a honeycomb structure comprising slits in the form of gas blowing holes **32** or **6** (see FIGs. 2 or 6), wherein,

> "The maximum opening area of each blowing pore **32** formed in the separator wall **3** is equal to the sectional area of each axially extending passage **21** or **22**. When the opening area of each blowing pore exceeds the sectional area of the passage **21** or **22**, almost all the exhaust gases pass through the blowing pores without interfering with the

separator walls and are discharged from the outlet passages so that the carbon particles are neither caught nor collected by the filter." (see column 4, lines 19-28); and

"The pressure loss and the collecting efficiency were measured in relation to the opening area of the exhaust gas blowing holes **6**... As a result, the proper opening area of the blowing holes **6** was 0.5 to 10% of the total opening area of the passages **2**," (see column 5, lines 16-24).

Accordingly, one having ordinary skill in the art would have routinely optimized the dimensions of each slit to achieve the desired opening area for each slit, in order to obtain the desired amount of pressure loss and particle collecting efficiency in the system, *In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980), and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Regarding claim 11, Kuwamoto et al. discloses that a sectional shape of the through channel **3** is quadrangular (see, e.g., FIG. 2).

Regarding claim 12, Kuwamoto et al. discloses that the honeycomb structure may be made of cordierite or mullite (see column 6, lines 11-20).

Regarding claim 17, the heating means **17a**, **17b** of Kuwamoto et al. meets the claim (see column 6, lines 48-53; column 9, lines 10-26).

Regarding claims 18 and 19, Kuwamoto et al. discloses that an internal combustion engine (i.e., a diesel engine **6**; FIG. 3) is in communication with the honeycomb structure.

Regarding claim 20, expressions relating the apparatus to contents thereof during an intended operation are of no significance in determining patentability of the apparatus claim. *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969), and the inclusion of a material or article

worked upon by a structure being claimed does not impart patentability to the claims. *In re Young*, 75 F.2d 966, 25 USPQ 69 (CCPA 1935); *In re Otto*, 312 F.2d 937, 136 USPQ 458, 459 (CCPA 1963). Thus, the recitation of a non-burnable material comprising ashes adds no further patentable weight to the claim.

6. Claims 5-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuwamoto et al. (US 5,853,459) in view of Hijikata et al. (US 5,566,545) and Tomita et al. (US 4,464,185), as applied to claim 1 above, and further in view of Hidaka et al. (EP 1 128 031).

The collective teaching of Kuwamoto et al., Hijikata et al. and Tomita et al. is silent as to varying the slit length, such that the length of the slits in the vicinity of the outer peripheral portion of the honeycomb structure is longer than the length of the slits located in a central portion of the honeycomb structure. Hidaka et al., however, teaches a honeycomb structure wherein the length of the slits in the vicinity of the outer peripheral portion of the honeycomb structure is longer than the length of the slits located in a central portion of the honeycomb structure **1** (see section [0054]). It would have been obvious for one of ordinary skill in the art at the time the invention was made to configure the slits in the modified honeycomb structure of Kuwamoto et al. such that the length of the slits in the vicinity of the outer peripheral portion of the honeycomb structure was longer than the length of the slits located in a central portion of the honeycomb structure, on the basis of suitability for the intended use and absent a showing of unexpected results thereof, because such a configuration would enable the filtrate to be more efficiently discharged to the external space, as taught by Hidaka et al.

An increase in slit length is directly proportional to an increase in the slit open area. Although Hidaka et al. is silent as to teaching other means for increasing the slit open area (e.g.,

by increasing the number of slits at the outer periphery, or by increasing the width of the slits and the outer periphery, whereby the width of the slit would vary from slit to slit), it would have been obvious for one of ordinary skill in the art at the time the invention was made to select other suitable means for increasing the slit open area in the modified honeycomb structure of Kuwamoto et al., on the basis of suitability for the intended use and absent a showing of unexpected results thereof, because the substitution of known equivalent structures involves only ordinary skill in the art, and the substitution of known equivalent techniques, e.g., for enlarging the slit open area at the outer periphery, would have been obvious. *Ex parte Novak* 16 USPQ 2d 2041 (BPAI 1989); *In re Mostovych* 144 USPQ 38 (CCPA 1964); *In re Leshin* 125 USPQ 416 (CCPA 1960); *Graver Tank and Manufacturing Co. v. Linde Air Products Co.* 85 USPQ 328 (USSC 1950); *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958).

7. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kuwamoto et al. (US 5,853,459) in view of Hijikata et al. (US 5,566,545) and Tomita et al. (US 4,464,185), as applied to claim 1 above, and further in view of Manson (US 6,248,689).

Kuwamoto et al. is silent as to the honeycomb structure **15a**,**15b** carrying an oxidation catalyst. Manson, however, teaches a honeycomb structure **100** that is coated with an oxidation catalyst (see column 4, line 66 to column 5, line 2; and column 5, line 16 to column 6, line 4). It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide an oxidation catalyst on the honeycomb structure in the modified apparatus of Kuwamoto et al., because the oxidation catalyst would help oxidize soot and other hydrocarbonaceous materials found in the exhaust gas of diesel engines at the temperatures normally found in

the engine's exhaust manifold, as taught by Manson (see, e.g., column 5, lines 4-11).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JENNIFER A. LEUNG whose telephone number is (571) 272-1449. The examiner can normally be reached on 9:30 am - 5:30 pm Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jennifer A. Leung/
Primary Examiner, Art Unit 1797